

THE SPIDER GENUS *NAPOMETA* (ARANEAE, ARANEOIDEA, LINYPHIIDAE)

Gustavo Hormiga: Department of Biological Sciences, George Washington University, Washington, D.C. 20052 USA

ABSTRACT. The spider genus *Napometa* Benoit, which had been erroneously placed in the Metinae (Tetragnathidae), is transferred to the family Linyphiidae. The only two known species of *Napometa*, *N. sanctaehelenae* and *N. trifididens*, are redescribed and illustrated.

The spider genus *Napometa* was erected by Benoit (1977) to include two species from St. Helena island, in the South Atlantic Ocean: *N. sanctaehelenae* Benoit 1977 and *N. trifididens* (O. Pickard-Cambridge 1873). Benoit designated *N. sanctaehelenae* as the type species of this new genus within the then araneid subfamily Metinae (currently a subfamily within Tetragnathidae; see Hormiga et al. (1995) for a summary of the taxonomic history of the separation of Araneidae and Tetragnathidae). *N. trifididens*, originally described by Pickard-Cambridge as a linyphiid, had been in the theridiid genus *Enoplognatha* Pavesi 1880 (Simon 1894) for three-quarters of a century when Benoit transferred it to *Napometa*. Since then no other species have been described within *Napometa*, and the genus is currently listed as a member of the family Tetragnathidae (Platnick 1993; Dippenaar-Schoeman & Jocqué 1997).

The male palp illustrations that accompanied Benoit's description of *Napometa* cast some serious doubts about its familial assignment. Benoit's ventral (figs. 76a, 77c) and mesal (fig. 76b) views of the male palp resemble a typical linyphiid, with the U-shaped intersegmental paracymbium and the suprategular apophysis clearly depicted. Examination of Benoit's specimens confirms that *N. sanctaehelenae* and *N. trifididens* are in fact linyphiids, not tetragnathids nor araneids.

Benoit's descriptions of *Napometa* species focused almost exclusively on somatic morphology, with little attention to the details of the genitalic morphology. The purpose of this paper is to transfer *Napometa* to its correct familial placement (Linyphiidae) and describe and illustrate in more detail the genitalic mor-

phology of *N. sanctaehelenae* and *N. trifididens*. The somatic morphology is also illustrated to complement Benoit's detailed description.

METHODS

General methods of study are described in Hormiga (1994a). The morphological observations were carried out using a Leica MZA-PO dissecting microscope and a Leica DMRM compound microscope. For examination of the genitalic structures under transmitted light microscopy the specimens were immersed in methyl salicylate (Holm 1979) and mounted using Coddington's (1983) temporary slide mounting method. All illustrations were done using a camera lucida and inked on drafting film or coquille board. All measurements are in millimeters. Abbreviations are listed in Table 1.

TAXONOMY

Linyphiidae Blackwall 1859

Napometa Benoit 1977

Napometa Benoit 1977: 185. Type species, by original designation, *Napometa sanctaehelenae* Benoit 1977. Brignoli 1983: 230. Platnick 1989: 299. Platnick 1993: 377. Dippenaar-Schoeman & Jocqué 1997: 292, 338.

Etymology.—Benoit did not explain the etymology of *Napometa*. Presumably he derived this name from the tetragnathid genus *Meta* Koch 1836. As for the *Napo-* prefix, Don Cameron (*in litt.*) suggests that it is derived from Napoleon, the most famous resident of the type locality, St. Helena. Thus, Benoit may have intended to convey with this name "Napoleon's *Meta*."

Diagnosis.—*Napometa* differs from other

Table 1.—Anatomical abbreviations used in the figures.

A	Alveolus
CD	Copulatory duct
CO	Copulatory opening
E	Embolus
EM	Embolic membrane
FD	Fertilization duct
m	Membrane (or membranous)
LC	Lamella characteristica
P	Paracymbium
S	Spermatheca
SA	Suprategular apophysis
SPT	Suprategulum
ST	Subtegulum
T	Tegulum
TA	Terminal apophysis

linyphiids by the following combination of characters: cymbium with “free” pointed apex (Fig. 1); U-shaped intersegmental paracymbium with broad proximal arm; embolus short, not thread-like, with blunt apical end; large lamella characteristica with a conspicuous, caudally directed, pointed process (Figs. 3, 15). Terminal apophysis with a single coil and a hollow axis (Fig. 3). Epigynum (*N. trifididens* females are unavailable for study) with a small dorsal plate scape with a socket (Fig. 6); epigynal copulatory openings small and inconspicuous.

Description.—*Male*: Clypeus height 5–6× an anterior median eye diameter (Figs. 11, 17). Chelicerae large, with 5–8 prolateral and 5 retrolateral teeth; stridulatory organ absent. Trichobothrium metatarsus IV absent. Palp (Figs. 1–3, 11, 12): patella short, with a dorsal macroseta. Tibia almost as long (ca. 75–80%) as the cymbium; one or two prolateral and two or three retrolateral trichobothria and one ectal macroseta. Cymbium with pointed apex; alveolus occupying the basal ⅔ of the cymbium, leaving the distal ⅓ “free.” Paracymbium U-shaped, attached by means of a membrane to the cymbium base, the proximal arm being much wider than the tapered distal arm. Tegulum with an apical lobe. Suprategular apophysis hook-shaped, visible in ectal and ventral views, distad of the tegular lobe. Embolus partially visible, in ectal view, between the suprategular apophysis, tegular lobe and apical process of the lamella; apical end of embolus blunt. Two membranes associated with the

embolus are visible between the suprategular apophysis and the apical process of the lamella; one of them seems to be attached to the lamella and the other seems to be true embolic membrane (*sensu* Hormiga 1994b; this homology statement requires confirmation by dissecting the embolic division when more specimens become available). Terminal apophysis with a single coil and a hollow axis. Lamella large (about ⅔ of the cymbium length) with a long and pointed posterior process.

Female: See under *Napometa sanctaehelenae* (*N. trifididens* females are unavailable for study; therefore, the description of the females of the genus has to be based on the females of the type species only).

Composition.—Two species, *Napometa sanctaehelenae* Benoit and *N. trifididens* (O. Pickard-Cambridge).

Distribution.—Endemic to St. Helena island.

Napometa sanctaehelenae Benoit 1977
Figs. 1–13

Napometa sanctaehelenae Benoit 1977: 185–187, figs. 76a–g ‘ob ♂ ♀]. – Brignoli 1983: 230.

Types.—Female holotype from St. Helena, labels state “*Napometa sanctaehelenae* Benoit ♀ HOLOTYPE; DET. P.L.G. Benoit 1970; LOC. Ste. Hélène Centre: High Central Ridge 2600/2700 ft. 17/XII/1965; REC. P. Basilewsky, P. Benoit, N. Leleup; R.G. Mus. Afr. Centr. 129.143,” “Mission Zoologique Belge 1965/66 (P. Basilewsky, P. Benoit, N. Leleup)” and “MT 129.143.” Female paratypes from St. Helena, labels state “*Napometa sanctaehelenae* Benoit ♀ PARATYPES; DET. P.L.G. Benoit 1970; LOC. Ste. Hélène Centre: High Central Ridge, Cabbage Tree Road 2500 ft.; REC. J. Decelle, N. et J. Leleup IV/1967; R.G. Mus. Afr. Centr. 133.388,” “Mission Zoologique Belge 1965/66 (P. Basilewsky, P. Benoit, N. Leleup),” “Det. P.L.G. Benoit 1970 ♀ *Napometa sanctaehelenae* n. sp. paratypes” and “MT 133.388” (3 ♀ & 3 juveniles; one of the epigyna is missing). Male paratype from St. Helena, labels state “*Napometa sanctaehelenae* Benoit ♂ Allotype; DET. P.L.G. Benoit 1970; LOC. Ste. Hélène Centre: High Central Ridge 17/XII/1965; REC. P. Basilewsky, P. Benoit, N. Leleup; R.G. Mus. Afr. Centr. 136.386,” “Det. P.L.G. Benoit 1970 *Napometa sanctaehelenae* n. sp. ♂ allotype”

and "MT 136.386." All types are deposited at the Royal Museum for Central Africa (Tervuren) and have been examined.

Diagnosis.—The male of *N. sanctaehelenae* can be distinguished from that of *N. trifididens* by the anteromesal process with three cheliceral teeth found in the latter species but not in the former (Figs. 12, 17). The distal arm of the paracymbium of *N. sanctaehelenae* (Fig. 1) is narrower than that of *N. trifididens* (Fig. 14). The anteroectal process of the lamella, as seen in a mesal view, is long and pointed in *N. sanctaehelenae* (Fig. 2) and is flat in *N. trifididens* (Fig. 15). The number of pedipalpal tibia trichobothria is also different between these two species: two prolateral and three retrolateral in *N. sanctaehelenae* versus one prolateral and two retrolateral in *N. trifididens* (Figs. 1, 14).

Description.—*Male (paratype)*: Abdomen and cephalothorax are illustrated in Figs. 11–13. Measurements and a detailed description of the male and female somatic morphology are provided by Benoit (1977). Total length 5.15. Cephalothorax 2.15 long, 1.60 wide; abdomen 3.10 long, 1.58 wide. Chelicerae with 7–8 prolateral and 5 retrolateral teeth. Palp (Figs. 1–3): Tibia almost as long (*ca.* 75%) as the cymbium; two prolateral and three retrolateral trichobothria. Cymbium with three mesal and one dorsal macrosetae. Lamella with a pointed ectodistal process, a blunt mesal process, a rounded projection on the mesodorsal margin, and a long and pointed posterior process.

Female (paratype): Abdomen and cephalothorax are illustrated in Figs. 9, 10. Total length 6.80. Cephalothorax 2.64 long, 1.78 wide; abdomen 3.88 long, 3.12 wide. Chelicerae with 8–9 prolateral and 8 retrolateral teeth (Benoit's depiction of the female prolateral teeth, his figure 76d, is not entirely accurate; see Fig. 10). Pedipalp with tarsal claw. Trichobothrium metatarsus I 0.15. Posterior lateral spinnerets with enlargement of the peripheral cylindrical silk gland spigot base.

Epigynum (Figs. 4–8): slightly broader than long, protruding very little from the abdominal wall. Dorsal plate with a small scape (somewhat exaggerated in Benoit's fig. 76f) with a shallow socket. Benoit's illustration of the vulva (fig. 76g) is inaccurate (compare to Fig. 7). The copulatory openings are located on both sides of the dorsal plate, near the lat-

eral plate (Figs. 7, 8). There is no clear distinction between the end of the copulatory duct and the beginning of the spermatheca. The copulatory duct spirals around the fertilization duct, the latter changes from a ventral into a dorsal position by turning around the proximal end of the former (i.e., near the copulatory opening).

Distribution.—Known only from St. Helena island.

Material examined.—Only the type series.

Napometa trifididens (O. Pickard-Cambridge 1873)
Figs. 14–17

Linyphia trifididens, - O. Pickard-Cambridge 1873: 220–222.

Linyphia trifidens, - Melliss 1875: 212 (*lapsus calami*).

Leptyphantes trifidens, - Simon 1883: 306, 311.

Enoplognatha trifidens, - Simon 1894: 578.

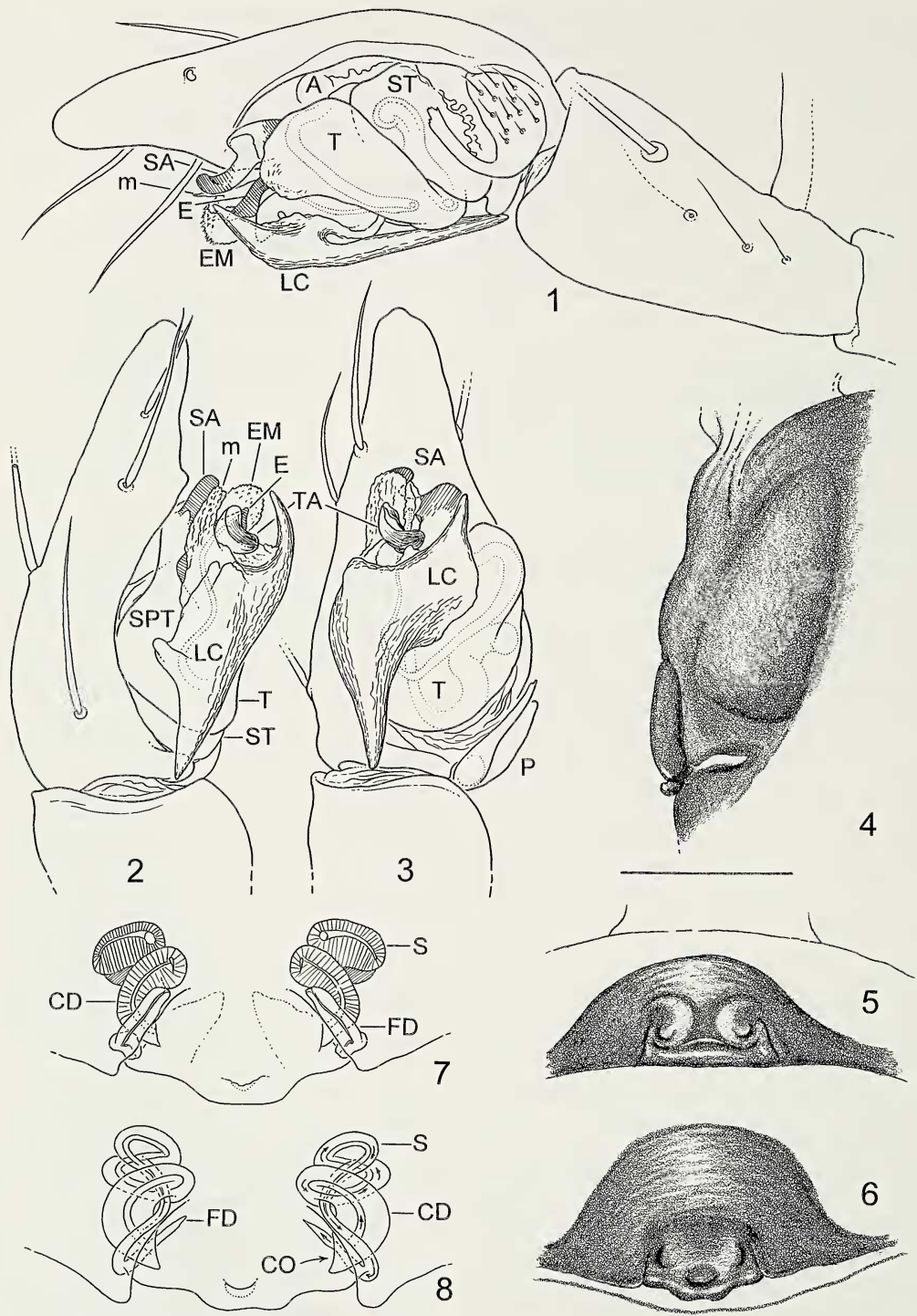
Enoplognatha trifididens, - Roewer 1942: 402. - Bonnet 1956: 48.

Napometa trifididens, - Benoit 1977: 187–188, figs. 77a–c [♂]. - Platnick, 1993: 377–378.

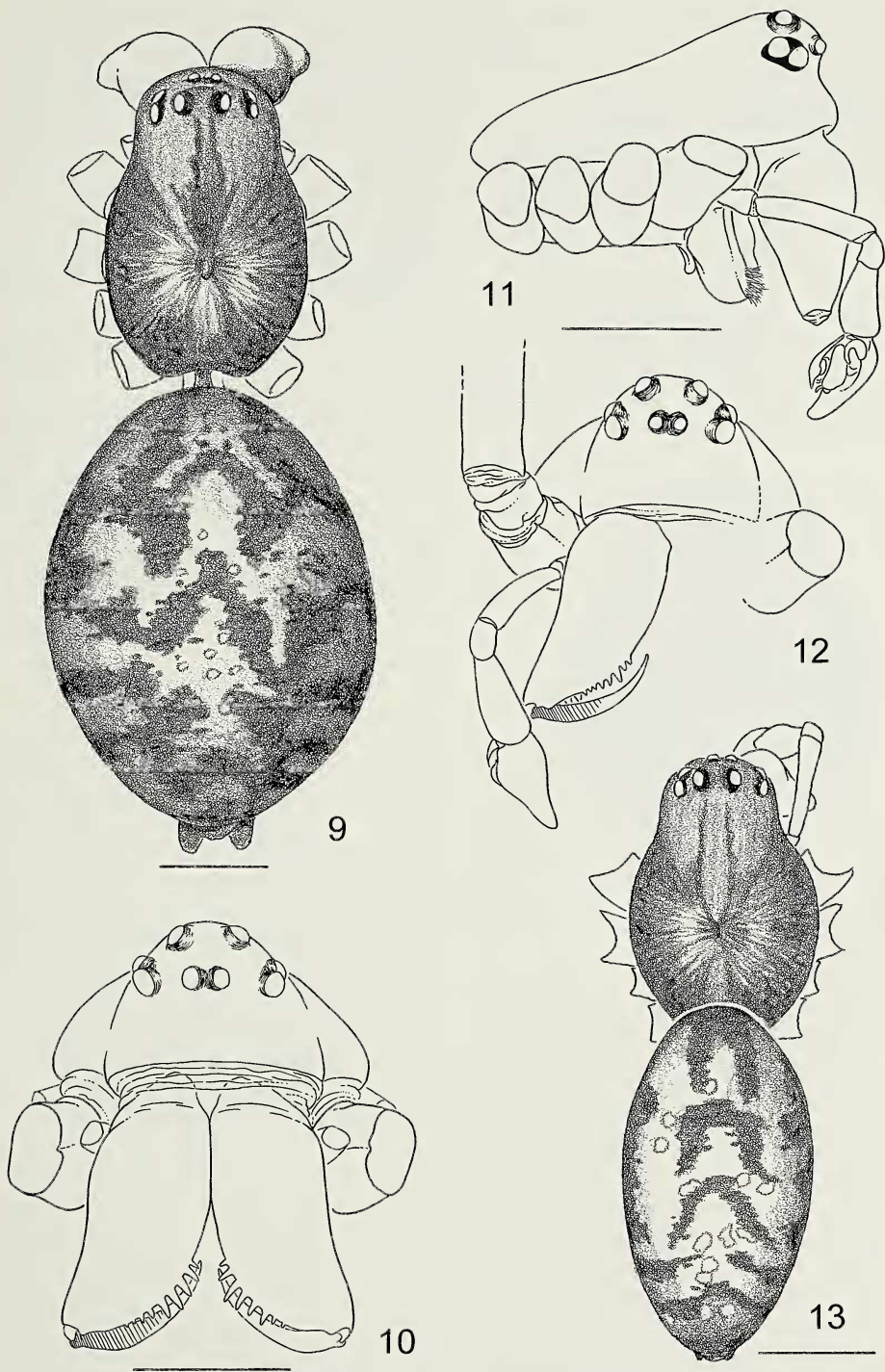
Types.—According to Benoit (1977) the original type series studied by O. Pickard-Cambridge consisted of 3♂ (two of them adults) and 1♀, but only 1♂ remains deposited in The Oxford University Museum; the other ♀ & ♂ are presumably lost. To my knowledge no female specimens of this species are available for study. I have not examined the mentioned type, studied by Benoit, to compare, identify and describe the only other male specimen available in collections. My descriptions are based upon only that other specimen.

Diagnosis.—The male of *Napometa trifididens* can be distinguished from that of *N. sanctaehelenae* by the anteromesal cheliceral process with three teeth found in the former species but not in the latter (Figs. 12, 17). The distal arm of the paracymbium of *N. trifididens* (Fig. 14) is wider than that of *N. sanctaehelenae* (Fig. 1). See diagnosis under *Napometa sanctaehelenae* for more details.

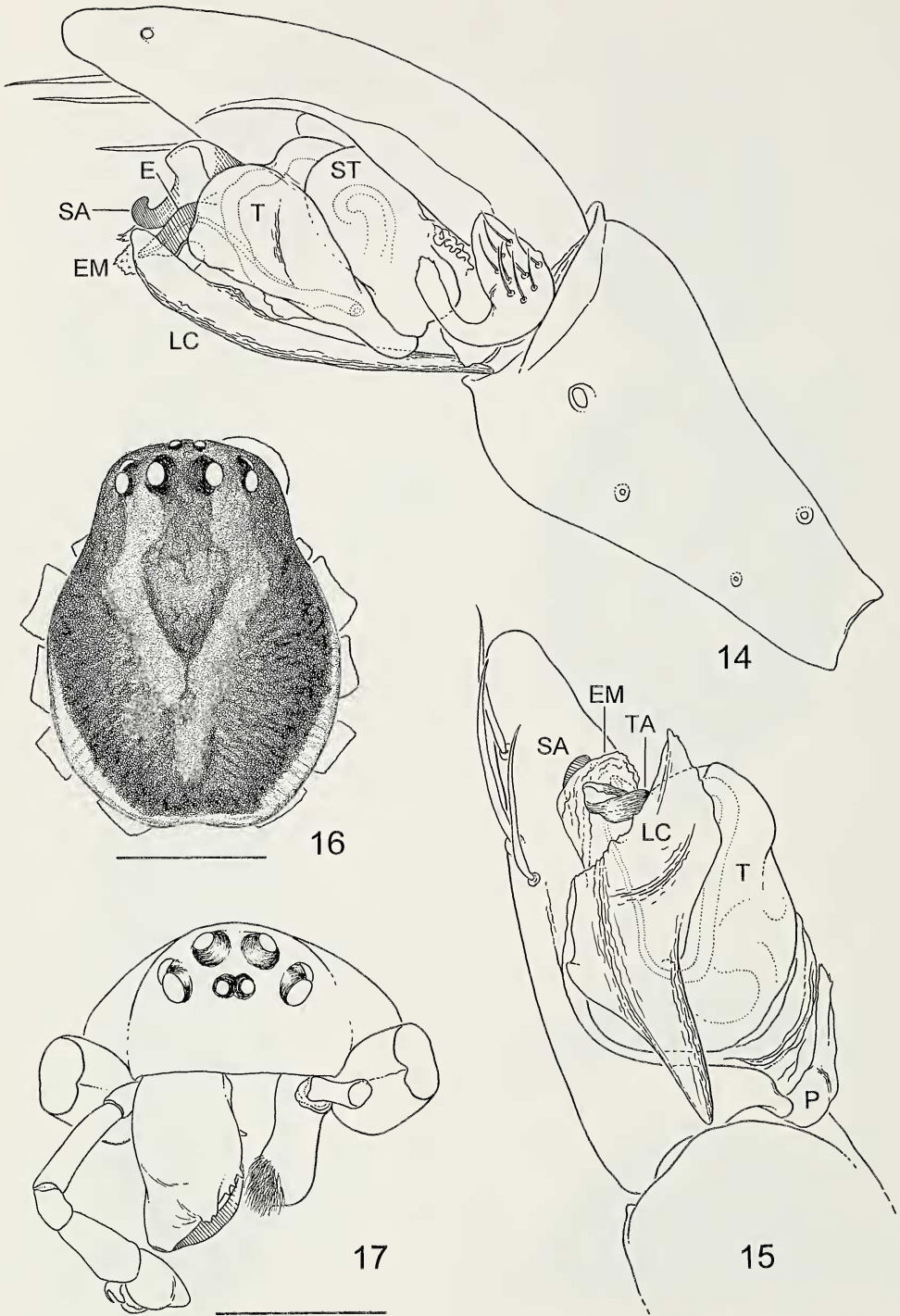
Description.—*Male* (High Central Ridge): Cephalothorax is illustrated in Figs. 16, 17. Measurements and a detailed description of the somatic morphology are provided by Benoit (1977). Total length 4.85. Cephalothorax 2.50 long, 1.90 wide; abdomen 2.25 long,



Figures 1-8.—*Napometa sanctaehelenae* Benoit. 1-3, Left male palp (paratype); 1, Ectal (broken trichobothria are indicated by dotted lines); 2, Mesal; 3, Ventral. 4-8, Epigynum (paratype); 4, Lateral; 5, Caudal; 6, 7, Ventral; 8, Schematic, ventral. (Scale bar = 0.5 mm).'



Figures 9–13.—*Napometa sanctaehelenae* Benoit. 9, Female paratype, dorsal view; 10, Female paratype, anterior view; 11, Male paratype, lateral view; 12, Male paratype, anterior view (left chelicera removed); 13, Male paratype, dorsal view. (Scale bars = 1.0 mm).



Figures 14–17.—*Napometa trifididens* (O. Pickard-Cambridge), male from Ste. Hélène Centre, High Central Ridge. 14, Palp, ectal; 15, Palp, ventral; 16, Cephalothorax, dorsal view (left chelicera removed); 17, Cephalothorax, anterior view. (Scale bars = 1.0 mm).

1.50 wide. Chelicerae with 5–6 prolateral (3 are grouped on an anteromesal process, Fig. 17) and 5 retrolateral teeth. Palp (Figs. 14, 15): Tibia almost as long (*ca.* 80%) as the cymbium; one prolateral and two retrolateral trichobothria. Cymbium with one ectal, three mesal and one dorsal macrosetae. Lamella with a flat and relatively wide ectodistal process, a rounded projection on the mesodorsal margin, and a long and pointed posterior process.

Distribution.—Known only from St. Helena island.

Material examined.—Male from St. Helena, labels state “*Napometa trifididens* ♂ O.P.C.; DET. P.L.G. Benoit 1970; LOC. Ste. Hélène Centre: High Central Ridge 2600/2700 ft. 17/XII/1965; REC. P. Basilevsky, P. Benoit, N. Leleup; R.G. Mus. Afr. Centr. 133.778,” “Mission Zoologique Belge 1965/66 (P. Basilevsky, P. Benoit, N. Leleup)” and “MT 133.778.” Deposited at the Royal Museum for Central Africa (Tervuren).

DISCUSSION

Napometa sanctaehelenae and *N. trifididens* lack two of the three known synapomorphies of Tetragnathidae (Hormiga et al. 1995), namely the conductor and the embolus spiraling with each other and the tegular sclerites in apical position. These two species share with tetragnathids and linyphiids the absence of the araneoid median apophysis. On the other hand *Napometa* species have three out of the four synapomorphies of linyphioids (Pimoidae plus Linyphiidae; Hormiga 1993, 1994a, b): absence of paracymbial apophyses, autospasy at the patella-tibia junction, and enlargement of the peripheral cylindrical silk gland spigot base on the PLS. In addition *Napometa* has the following linyphiid synapomorphies (Hormiga 1994b, 1995): intersegmental paracymbium, suprategulum, absence of median apophysis and conductor, embolic membrane, radix, and column (the latter two characters require confirmation by dissecting the embolic division when more specimens become available for study). Therefore, *Napometa* species are members of the Linyphiidae, not of the Metinae, as Benoit (1977) had suggested when he described the genus. Ironically, *N. trifididens* had been correctly described as a linyphiid by O. Pickard-Cambridge (1873), although this author thought

that *trifididens* could be a close relative of the metines:

“*L. (Linyphia) trifididens* shows a decided approach to Spiders of the genera *Pachygnatha* and *Meta*; and it is not without some hesitation that I have (in absence of any knowledge of its habits) placed it in the genus *Linyphia*” (*op. cit.*, p. 222).

Simon (1894) transferred *trifididens* to the theridiid genus *Enoplognatha* (although he expressed some doubts about its affinities), perhaps because the large chelicerae of *trifididens* had some resemblance to those of *Enoplognatha*.

Benoit mistakenly thought of these two linyphiid species as metines, perhaps based on some notion of overall somatic similarity (although this is not explicitly stated in his text). Benoit’s diagnosis of *Napometa* focuses almost exclusively on somatic characters (with the exception of the cymbium shape) and is written in the context of how to tell the genus apart from *Meta* (Tetragnathidae). Nevertheless, much of the cladistic evidence at the higher level in tetragnathids and linyphiids comes from the male palpal morphology (e.g., Hormiga 1994b; Hormiga et al. 1995). The lack of cladistic hypotheses in linyphiid systematics (see Hormiga 1994b) makes it impossible at the present time to hypothesize, on the basis of shared apomorphies, what the closest relatives of *Napometa* may be. It also prevents any attempts to provide a phylogenetic characterization (i.e., based on synapomorphies) of the genus. Nevertheless, the genitalic morphology of *Napometa* suggests that its close relatives may be found in the linyphiid clade that includes the genera *Nerienne* Blackwall 1833, *Linyphia* Latreille 1804 and *Microlinyphia* Gerhardt 1928 (van Helsdingen 1969, 1970), although *Napometa* does not fit in any of these three genera as they are currently defined. Understanding the origin and phylogenetic position of *Napometa* therefore will not be possible until we have a cladistic hypothesis for the higher level systematics of linyphiids.

ACKNOWLEDGMENTS

I would like to thank Rudy Jocqué for the loan of specimens. Don Cameron helped to elucidate the possible etymology of *Napome-*

ta. Comments on an earlier draft of this manuscript were provided by Todd Blackledge, Charles Griswold, Rudy Jocqué, Jeremy Zujko-Miller, Petra Sierwald, and Peter van Helsdingen. This research has been funded in part by a George Washington University Facilitating Grant.

LITERATURE CITED

- Benoit, P.L.G. 1977. La faune terrestre de l'île de Sainte-Hélène, quatrième partie, 3. Arachnida: 3. Araneae, 22. Fam. Araneidae. Ann. Mus. Roy. Afrique Centrale (Zool.), 220:184–188.
- Bonnet, P. 1956. Bibliographia Araneorum. Vol. 2, part 3, pp. 1927–3026. Toulouse: Les Frères Douladoure.
- Brignoli, P.M. 1983. A Catalogue of the Araneae Described between 1940 and 1981. Manchester Univ. Press. Manchester, 755 pp.
- Coddington, J.A. 1983. A temporary slide mount allowing precise manipulation of small structures. Pp. 291–292, In Taxonomy, Biology, and Ecology of Araneae and Myriapoda. (O. Kraus, ed.). Verh. Naturwiss. Ver. Hamburg, New Series 26.
- Dippenaar-Schoeman, A.S. & R. Jocqué. 1997. African Spiders. An Identification Manual. Plant Protection Research Institute Handbook No. 9. Pretoria. 392 pp.
- Holm, C. 1979. A taxonomic study of European and East African species of the genera *Pelecopsis* and *Trichopterna* (Araneae, Linyphiidae), with descriptions of a new genus and two new species of *Pelecopsis* from Kenya. Zool. Scripta, 8:255–278.
- Hormiga, G. 1993. Implications of the phylogeny of Pimoidae (new rank) for the systematics of linyphiid spiders (Araneae, Araneoidea, Linyphiidae). Mem. Queensland Mus., 33:533–542.
- Hormiga, G. 1994a. A revision and cladistic analysis of the spider family Pimoidae (Araneoidea, Araneae). Smithsonian Contrib. Zool. 549:1–104.
- Hormiga, G. 1994b. Cladistics and the comparative morphology of linyphiid spiders and their relatives (Araneae, Araneoidea, Linyphiidae). Zool. J. Linnean Soc., 111:1–71.
- Hormiga, G., W.G. Eberhard & J.A. Coddington. 1995. Web construction behavior in Australian *Phonognatha* and the phylogeny of nephiline and tetragnathid spiders (Araneae, Tetragnathidae). Australian J. Zool., 43:313–364.
- Melliss, J.C. 1875. St. Helena: A Physical, Historical and Topographical Description of the Island. London, 425 pp.
- Pickard-Cambridge, O. 1873. On the spiders of St. Helena. Proc. Zool. Soc. London, 1873:210–227.
- Platnick, N.I. 1989. Advances in Spider Taxonomy: A Supplement to Brignoli's "A Catalogue of the Araneae Described between 1940 and 1981." Manchester Univ. Press. Manchester, 673 pp.
- Platnick, N.I. 1993. Advances in Spider Taxonomy 1988–1991. New York Entomol. Soc. & American Mus. Nat. Hist., New York, 846 pp.
- Roewer, C.F. 1942. Katalog der Araneae von 1758 bis 1940. Vol. 1. Natura. Bremen, 1040 pp.
- Simon, E. 1883. Études Arachnologiques. 14e Mémoire. XXI. Matériaux pour servir à la Faune arachnologique des îles de l'Océan Atlantique. Ann. Soc. Entomol. France, (6)3:259–314.
- Simon, E. 1894. Histoire naturelle des Araignées. Librairie Encyclopédique de Roret, Paris.
- Van Helsdingen, P.J. 1969. A reclassification of the species of *Linyphia* Latreille, based on the functioning of the genitalia (Araneida, Linyphiidae) I. Zool. Verh. (Leiden), 105:1–303.
- Van Helsdingen, P.J. 1970. A reclassification of the species of *Linyphia* Latreille, based on the functioning of the genitalia (Araneida, Linyphiidae) II. Zool. Verh. (Leiden), 111:1–86.

Manuscript received 15 July 1997, revised 10 November 1997.